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17-ECD-0032

Ms. Alexandra K. Smith, Program Manager
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Ms. Smith:

RESPONSE TO THE WASHINGTON STATE DEPARTMENT OF ECOLOGY NOTICE OF DEFICIENCIES LETTER FOR CLASS 3 PERMIT MODIFICATION FOR THE EFFLUENT MANAGEMENT FACILITY SECONDARY CONTAINMENT

References:
1. Ecology letter from S. Dahl to K.W. Smith, ORP, and P. McCullough, BNI, "Ecology's Technical Deficiencies Review for the Class 3 Modification to the *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste*, Part III, Operating Unit Group 10, Waste Treatment and Immobilization Plant (WTP Permit), WA7890008967," 17-NWP-034, dated March 31, 2017.

2. ORP letter from K.W. Smith and M.G. McCullough, BNI, to A.K. Smith, Ecology, "Submittal of Dangerous Waste Permit Class 3 Modification Notification for the Effluent Management Facility, 24590-BOF-PCN-ENV-15-002," 16-ECD-0056/CCN: 292574, dated November 21, 2016.

This letter responds to the three deficiencies and eight technical comments in Reference 1. Deficiencies one and two had been previously provided to the Washington State Department of Ecology and were considered complete. The third deficiency required the Permittees to update text in the permit condition tables and Chapter 4, Process Information, and describe the ventilation system in Building 26 which is included in Attachment 1.

The eight other comments were provided by the Washington State Department of Ecology in Reference 1 and responses to those are provided in Attachment 2.

If you have any questions, please contact Chris Kemp, Director, Environmental Compliance Division, (509) 373-0649.

Kevin W. Smith
Manager

ECD:MEB

Attachments: (2)

cc w/attachs:
J. Cantu, Ecology
A.S. Carlson, Ecology
S.L. Dahl-Crumpler, Ecology
HF Operating Record (J.K. Perry, MSA, A3-01)
Administrative Record (WTP H-0-8)
BNI Correspondence
Environmental Portal, LMSI

cc w/o attachs:
L.W. Baker, BNI
R.E. Cone, BNI
M.W. Costas, BNI
B.L. Curn, BNI
A.J. Dobson, BNI
J.H. Dunkirk, BNI
M.W. Frei, BNI
L.L. Fritz, BNI
R.S. Hajner, BNI
K.D. Irwin, BNI
R.J. Landon, BNI
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E.F. Sproat, III, BNI
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M.E. Jones, Ecology
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R. Jim, YN
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Attachment 1
17-ECD-0032
(3 Pages Excluding Cover Sheet)

Changes to Chapter 4, Appendix 4G

and Lab, to the EMF and the LERF/ETF. Evaporator concentrate is sent back to the LAW Vitrification Facility through the LAWPS underground waste transfer line. In addition, liquid effluent can be transferred from the DEP System to the Hanford Tank Farms.

After every waste transfer from the LAWPS to LAW Vitrification Facility, the underground waste transfer lines are flushed and drained to the EMF low-point drain vessel (DEP-VSL-00001); the effluent is collected and processed at the EMF. The effluent is monitored for flow and density to minimize the volume of flush liquid that is transferred to the LAW concentrate receipt vessel.

There are eight major WTP underground waste transfer lines that support the EMF process. Line DEP-PB-00009-S32B-03 transfers LAWPS feed from the WTP property boundary to the low-point drain vessel. Line LCP-PB-03368-S32B-03 transfers LAWPS feed and EMF concentrate from the low-point drain vessel to the LAW Vitrification Facility. LAW LVP process effluent and LAW RLD process effluent are transferred from the LAW Vitrification Facility to the EMF through line LVP-ZY-00171-W31A-03. Lab RLD process effluent is transferred from the Lab to the EMF through line RLD-WU-22142-S32B-03. Line DEP-ZS-00069-W31A-03 returns EMF concentrate from the EMF to the WTP property boundary, with transfer to the Hanford Tank Farms. EMF effluent is transferred to the existing LERF/ETF transfer line that connects in between the Pretreatment Facility and the WTP property boundary through lines RLD-ZS-66989-W31A-04 and RLD-ZS-66991-W31A-03.

EMF Buildings

The EMF, located north of the Lab, is comprised of four buildings, the LAW effluent process building, the LAW effluent drain tank building, the LAW effluent electrical building, and the LAW effluent utility building. The EMF contains an evaporator system, nine major process vessels, three supporting reagent product storage tanks, heating, ventilation and air conditioning (HVAC) equipment, and electrical utilities. The buildings are described in more detail below.

Building 25 – LAW Effluent Process Building

The LAW effluent process building houses the DEP System and DVP System. The DEP System is the main process system for the EMF and consists of vessels and ancillary equipment used to support the collection, processing, and disposal of the mixed waste effluent from the LAW and Lab Facilities; a more detailed discussion of the processes contained in this building are located in section 4G.2 and 4G.3. The DVP System provides vessel ventilation for the DEP System vessels. A more detailed discussion of this system can be found in 4G.5.

Building 25A – LAW Effluent Drain Tank Building

The LAW effluent drain tank building consists of the low-point drain vessel (DEP-VSL-00001) and the drain tank maintenance area. The low-point drain vessel is sized to handle flushing of the DFLAW underground waste transfer lines, between the LAWPS and the LAW Vitrification Facility and the effluent lines between the LAW Vitrification Facility, the Lab and the EMF. A more detailed discussion of the processes contained in this building are located in 4G.2.

Building 26 – LAW Effluent Utility Building

The LAW effluent utility building contains the building ventilation HVAC high efficiency particulate air (HEPA) filters and fans, and the BOF utility pumps and storage vessels. The LAW effluent utility building shares a ventilation system with the LAW effluent process building. The treated DVP offgas from the LAW effluent process building ties into the exhaust duct in the LAW effluent utility building and is discharged to the atmosphere through the 150-foot-high stack. A more detailed discussion of this process

can be found in 4G.5.1. The building does not contain equipment that manages dangerous or mixed waste.

Building 27 – LAW Effluent Electrical Building

The LAW effluent electrical building houses most of the EMF electrical equipment, which includes electrical batteries and control/instrumentation equipment. It has a separate power supply and exhaust system. The building does not contain equipment that manages dangerous or mixed waste.

Figure 4G-1, EMF Process Flow, presents a simplified process flow diagram of the EMF Process.

4G.1 Containers

The dangerous and mixed waste generated at the EMF is managed in 90-day accumulation areas and satellite accumulation areas pursuant to the requirements in WAC 173-303-200, generating dangerous waste on-site. All waste anticipated to be dangerous or mixed waste is managed in accordance with WAC 173-303-170, requirements for generators of dangerous waste, through WAC 173-303-230, special conditions. The dangerous and mixed waste is labeled and characterized in accordance with requirements in WAC 173-303-070, designation of dangerous waste. Information on all 90-day accumulation areas and satellite accumulation areas is maintained as required in the Hanford Dangerous Waste Permit, Part II General Facility Conditions, permit condition II.I.1.a.

The dangerous and mixed waste generated at the EMF is containerized secondary waste. The following are examples of the generated secondary waste:

- Spent or failed equipment
- Offgas HEPA filters
- Personal Protective Equipment
- Spent maintenance materials

4G.2 Tank Systems

Permitted tank systems are designed to comply with bounding design criteria, such as pH, temperature, and pressure conditions. The EMF evaporator feed vessel (DEP-VSL-00002), the overhead sampling vessels (DEP-VSL-00004A/B), evaporator concentrate vessels (DEP-VSL-00003A/B/C), and the process condensate lag storage vessels (DEP-VSL-00005A/B) are located outside in secondary containment areas. The remaining EMF process vessel, the low-point drain vessel (DEP-VSL-00001), is located indoors, in a below grade process area. All tank systems are located within process areas with controlled access.

In general, overflows are prevented by inventory controls in conjunction with level monitoring. The fluid level in a vessel is maintained within low- and high-level ranges. Appropriate alarm settings are used to note deviations from the designed settings. Automatic and operator alarm responses are designed to shut down feed to the vessel when the high-level settings are exceeded.

A list of all EMF tank systems can be found in Table 4G-1, Effluent Management Facility Tank Systems.

A small volume of residual liquids may be present after the sump has been flushed and pumped using the large transfer pump. When residual liquid is detected the sample pumps (DEP-PMP-00042A/B) can be used to remove the residual liquids after the large transfer pump has completed the transfer.

The leak detection instrumentation for all secondary containment area sumps include a LKY function. The LKY function indicates an increase in fluid levels in the sump, even when residual liquid is present. The feed vessel area sumps are equipped with pumps that transfer the liquid to the appropriate vessel; the liquid is transferred after sampling occurs to characterize the liquid. Precipitation collected in the feed vessel area sumps can be transferred by sump pumps (DEP-PMP-00034A/B) to the overhead sampling vessels (DEP-VSL-00004A/B). Effluent from a spill is transferred to the low-point drain vessel (DEP-VSL-00001) by sump pumps (DEP-PMP-00034A/B) and recycled back into the process.

4G.5 Air Emission Control

4G.5.1 Direct Feed LAW EMF Vessel Vent Process System (DVP)

The Direct Feed LAW EMF Vessel Vent Process System (DVP) is comprised of two main parts, air intake and exhaust. The DVP is designed to maintain hydrogen levels below dangerous levels and remove mixed waste particulates that may be present in the gases that fill the headspace of select DEP System process vessels. The DEP System process vessels and condenser that directly interface with the DVP are the low-point drain vessel (DEP-VSL-00001), evaporator feed vessel (DEP-VSL-00002), evaporator concentrate vessels (DEP-VSL-00003A/B/C), overhead sampling vessels (DEP-VSL-00004A/B), process condensate lag storage vessels (DEP-VSL-00005A/B) and the evaporator after condenser (DEP-COND-00003). The headspace in the evaporator separator vessel (DEP-EVAP-00001) is exhausted by the DVP through the evaporator condensers (DEP-COND-00001/2/3). The inlet air is taken from lower contamination areas throughout the building to provide purged air for maintaining the DEP System process vessels below the lower flammability limit for hydrogen.

In the LAW effluent process building, ~~T~~the exhaust air is sent through a preheater (DVP-HTR-00001A/B), two-stages of HEPA filters (DVP-HEPA-00004A/B) and (DVP-HEPA-00003A/B), and an exhaust fan (DVP-EXHR-00001A/B). The exhaust fan is downstream of the DEP System process vessels, preheater and HEPA filters, to ensure that the DEP System vessel headspaces are at negative pressure. ~~which discharges the air into the EMF stack~~

~~D~~downstream of the EMF Active Confinement Ventilation System (ACV) HEPA filters and exhaust fans, the treated DVP offgas ties into the LAW effluent utility building exhaust duct, where it is discharged through the 150-foot-high EMF stack. ~~The exhaust fan is downstream of the DEP System process vessels, preheater and HEPA filters, to ensure that the DEP System vessel headspaces are at negative pressure.~~ The tie-in point to the LAW effluent utility building exhaust duct ~~to the EMF stack~~ is upstream of the stack monitoring systems, which monitor the exhaust air streams prior to discharge to the atmosphere.

4G.6 EMF Process Sampling

A liquid sampling station (DEP-HOOD-00001) is provided for the manual sampling of eight unique EMF process fluid streams, while maintaining the safety of the operator/worker. The sampling station consists of a standard fume hood, the low-point drain vessel (DEP-VSL-00001) process pipelines, manual

Attachment 2
17-ECD-0032
(5 Pages Excluding Cover Sheet)

Responses to Technical Comments
Listed in 17-NWP-034

Attachment 2- Responses to Technical Comments Listed on Enclosure

Ecology Technical Comment 1

Chapter 4 - Process Information

1. Page 4.20, Sumps and Leak Detection Boxes and Secondary Containment Drain Systems. Missing reference to EMF ancillary equipment list(s)

Response to Ecology Technical Comment 1

Section 4.2.6.1- Secondary Containment System Requirements, and Table 4G-4 (Effluent Management Facility Sumps, Leak Detection Boxes, Drain Lines/Floor Drains) in both the Sumps and Leak Detection Boxes section and the Secondary Containment Drains section lists the EMF ancillary equipment.

ORP, BNI, and Ecology agree that the reference to the EMF ancillary equipment list is not missing and the existing text in Chapter 4- Process Information, Section 4.2.6.1 is sufficient. No follow-up corrections or changes are necessary.

Ecology Technical Comment 2

Chapter 4G - Effluent Management Facility

1. Page 4G.9, Line 39: Comment #63 - "LDB" has not been defined

Response to Ecology Technical Comment 2

LDB is not defined when first used in Chapter 4- Appendix 4G. A proposed page change defining LDB when first used in Chapter 4- Appendix 4G is provided on page 3 of this attachment.

Ecology Technical Comment 3

Chapter 4I - Balance of Facilities

1. Page 4I.1 of App 4 BOF, Line 28; The correct acronym is "HDPE" not "HPDE"

Response to Ecology Technical Comment 3

"HPDE" is erroneously used instead of "HDPE" In Chapter 4- Appendix 4I. A proposed page change is provided on page 4 of this attachment.

Ecology Technical Comment 4

Chapter 4I - Balance of Facilities

2. Page 4I.4 Lines 31-35 are repetitive

Response to Ecology Technical Comment 4

A proposed page change is provided on page 5 of this attachment with the repetitive text removed.

Ecology Technical Comment 5

Chapter 7 - Contingency Plan

1. Page 7-2, Lines 39-40: RCR comment #4 was not incorporated into the document. The removal of lines 36-37 on page 7-3 was not done..

Response to Ecology Technical Comment 5

ORP, BNI, and Ecology met on April 5, 2017 and determined that this comment had been appropriately resolved. No follow-up corrections or changes are necessary.

Ecology Technical Comment 6

24590-BOF-PER-M-16-002 - Waste Removal Capability

1. Page 2, Bullet #6: Comments 3 and 4 - reference to paragraph 5.6 has not been made

Response to Ecology Technical Comment 6

ORP, BNI, and Ecology met on April 5, 2017 and determined that this comment had been appropriately resolved. No follow-up corrections or changes are necessary.

Ecology Technical Comment 7

2. Section 5.6, Para. 1, Sentence 1: Text in document does not match text in RCR comment

Response to Ecology Comment 7

ORP, BNI, and Ecology met on April 5, 2017 and determined that this comment had been appropriately resolved. No follow-up corrections or changes are necessary.

Ecology Technical Comment 8

24590-BOF-PER-M-16-003-DWP Liner Heights in the EMF

1. Page 1, Section 2, 1st paragraph: RCR comment #4, Introduction paragraph references only parts A and B of the WAC and not the entire regulatory requirements of A-D

Response to Ecology Technical Comment 8

ORP, BNI, and Ecology met on April 5, 2017 and determined that no action is required at this time. When the document is revised, the text will be changed in Section 2 to indicate that the reference pertains specifically to liner heights.

4G.4 Secondary Containment and Release Detection for EMF

The EMF is constructed of steel reinforced concrete. The design ensures that the containment units have sufficient structural strength to prevent collapse or failure. The primary barriers of the EMF containment units are designed to withstand loads from the movement of personnel, wastes, and equipment handling. Stainless steel liners are provided on the interior floors, and a portion of the walls, for the areas containing the low-point drain vessel (DEP-VSL-00001), the evaporator feed vessel (DEP-VSL-00002), and the evaporator concentrate vessels (DEP-VSL-00003A/B/C). The remaining containment areas are provided with special protective coatings that are constructed with chemical-resistant water stops and compatible with the stored waste.

The specifications for the preparation, design, and construction of the secondary containment systems are documented in Operating Unit Group 10, Appendix 13.7, and designed to applicable national codes and standards. Construction of tank systems to required specifications ensures that foundations are capable of supporting tank and secondary containment systems and that uneven settling and failures from pressure gradients will not occur.

Table 4G-3, Effluent Management Facility Secondary Containment Rooms/Areas and Table 4G-4, Effluent Management Facility Sumps, Leak Detection Boxes (LDBs), Drain Lines and Floor Drains, summarizes the EMF secondary containment systems.

4G.4.1 Low-Point Drain Sump (DEP-SUMP-00001)

The low-point drain sump (DEP-SUMP-00001) is used to capture overflow effluent from the low-point drain vessel (DEP-VSL-00001). In addition, underground waste transfer line leak detection box drain headers discharge to the low-point drain sump. The low-point drain sump discharges to the evaporator feed vessel (DEP-VSL-00002). The liquid level in the low-point drain sump is monitored with transmitters that communicate with the PCJ and provide control room alarm indication.

4G.4.2 Pipeline Containment and Leak Detection

The DEP System has LDBs on the headers of the coaxial underground waste transfer piping. Leak detection boxes are provided for the underground transfer lines from LAWPS to LAW Vitrification Facility. Leak detection boxes are also provided on underground transfer lines between EMF and LAW Vitrification Facility, between EMF and Lab, between EMF and the Hanford Tank Farms, and between EMF and the LERF/ ETF. The WTP underground transfer line LDBs are located in the LAW effluent drain tank building (Room ED-B001) with the exception of the LERF/ ETF transfer line LDBs which are located at the interface point on the WTP property line. The LDBs are designed to detect a leak within the annular space of the coaxial piping. The liquid level in the sumps is monitored with transmitters that communicate with the PCJ and provide control room alarm indication.

Within EMF, the pipelines associated with the tank systems/miscellaneous units are primarily single-walled. Secondary containment is provided for piping within the plant through the use of special protective coatings and waterstops or stainless liners in process areas and process rooms. A short section of process piping is located in a pipe chase in Room ED-CH01, between the west process area and the low-point drain tank area, where coaxial piping is used. The leak detection equipment located within the process areas and process rooms sumps alert operators of a piping leak through the use of level detection

4I Balance of Facilities (BOF)

The Balance of Facilities(BOF) provides support systems and utilities required for the waste treatment processes within the Pretreatment Facility, Low-Activity Waste (LAW) vitrification facility, High-Level Waste (HLW) vitrification facility, Analytical Laboratory (Lab), and the Effluent Management Facility (EMF). These will include, but not limited to, heating and cooling, process steam, process ventilation, chilled water, primary and secondary power supplies, and compressed air. The primary BOF process support systems are:

- Plant service air (PSA)
- Plant cooling water (PCW)
- Low-pressure steam (LPS)
- High-pressure steam (HPS)
- Demineralized water (DIW)
- Process service water (PSW)
- Chilled water (CHW)
- Glass former reagent (GFR)
- Cathodic protection (CPE)

The BOF systems are described in Sections 4I.1 through 4I.10. The BOF support and utility systems described in sections 4I.2 through 4I.9 will not manage dangerous waste, and are described below for informational purposes only. Section 4I.1 addresses BOF dangerous waste container management areas, and Section 4I.10 addresses the BOF cathodic protection system (CPE). The majority of the of underground piping systems within the CPE system are not dangerous/mixed waste lines, however, a segment of dangerous/mixed waste underground transfer lines between the Pretreatment Facility, and the HLW Vitrification Facility, the LAW Vitrification Facility, and the Lab are cathodically protected. Underground waste transfer lines to support the Direct Feed LAW configuration are isolated from the soil environment with insulation and an HDPE ~~HPDE~~ jacket, and are not part of the CPE system.

4I.1 Containers

This section identifies the containers and container management practices that will be followed at the BOF. The term "container" is used as defined in Washington Administrative Code (WAC) 173-303-040). Note that in this appendix and throughout the permit, terms other than containers may be used, such as canisters, boxes, bins, flasks, casks, and overpacks.

The container storage areas located within the BOF include:

- Nonradioactive dangerous waste storage area
- Failed melter storage facility

Container storage area dimensions at the BOF are summarized in Table 4I-1.

The following sections address waste management containers:

- Description of Containers - Section 4I.1.1
- Container Management Practices - Section 4I.1.2
- Container Labeling - Section 4I.1.3
- Containment Requirements for Storing Waste - Section 4I.1.4
- Prevention of Ignitable, Reactive, and Incompatible Wastes in Containers - Section 4I.1.5

- Laboratory information management system
- Waste tracking and inventory system

Inventory and Batch Tracking

The waste tracking and inventory system will interface with the information system data historian to provide reporting information such as tank volumes, waste characteristics, and facility inventories of process waste. The waste tracking system will also be used to query operations parameters at any time information is needed, as specified by operations, to manage the process system.

Secondary Waste Stream Tracking

Containerized secondary waste streams and equipment will be tracked and managed through commercially available database management software. Containers will be mapped in each plant and updated during the inspection process using a commercially available drawing software application.

Laboratory Information Management System

The laboratory information management system (LIMS) will be an integral feature of the plant information network. The LIMS will serve as an essential tool for providing data management of regulatory and processing samples. The chosen LIMS will be a commercial off-the-shelf software package designed for performing laboratory information management tasks as described in ASTM E1578-93, *Standard Guide for Laboratory Information Management Systems (LIMS)*.

The LIMS will track the flow of samples through the laboratory. Samples received in the laboratory will be identified with a unique identification label. The identification label provides details of the sample process stream. Baseline analyses are defined by the requesting plant. Additional analyses, as required, will be input into LIMS by laboratory analysts. Data will be input into LIMS manually or by data transfer using LIMS/instrument interface. Analyses will be performed using approved and validated analytical procedures.

Analytical results will be compiled by the LIMS and held pending checking and approval by appropriate staff. Approved results will be reported to the requesting plant.

4I.1.3 Container Labeling

Miscellaneous Mixed Waste Containers

The miscellaneous mixed waste containers will be labeled with the accumulation or generation start date, as appropriate, the major risk(s) associated with the waste, and the words "hazardous waste" or "dangerous waste." A waste tracking and inventory system will be implemented. Labels and markings will be positioned so that required information is visible. The label will meet the WAC 173-303-630(3) requirements, and the dangerous waste number will be clearly identified. ~~A waste tracking and inventory system will be implemented. Labels and markings will be positioned so that required information is visible, and the dangerous waste number will be clearly identified.~~

Miscellaneous Dangerous Waste Containers

The miscellaneous dangerous waste drums will be labeled with the accumulation or generation start date, as appropriate, the major risk(s) associated with the waste, and the words "hazardous waste" or "dangerous waste". A waste tracking and inventory system will be implemented. Labels and markings will be positioned so that required information is visible. The label will meet the WAC 173-303-630(3) requirements, and the dangerous waste number will be clearly identified.

4I.1.4 Containment Requirements for Storing Waste

Secondary containment requirements for the waste are discussed below.